1873MNRAS..33..291P

special subject concur in regarding Antarctic expeditions for viewing a transit early in December as altogether practicable.

The conclusion directly deducible from these results cannot be mistaken. England's duty is more than manifest; it has been to all intents and purposes admitted by her astronomical and nautical official representatives. And I cannot but express my conviction that it will be little less than a national calamity, as assuredly it will be scientifically most regrettable if any considerations, either of convenience or of personal dignity on the one hand, or of false courtesy on the other, should lead to the loss of opportunities which will not be again available for many years to come.

Note on the direct Determination of the Parallactic Displacement of Venus during her Transit. By Richard A. Proctor, B.A. Cambridge.

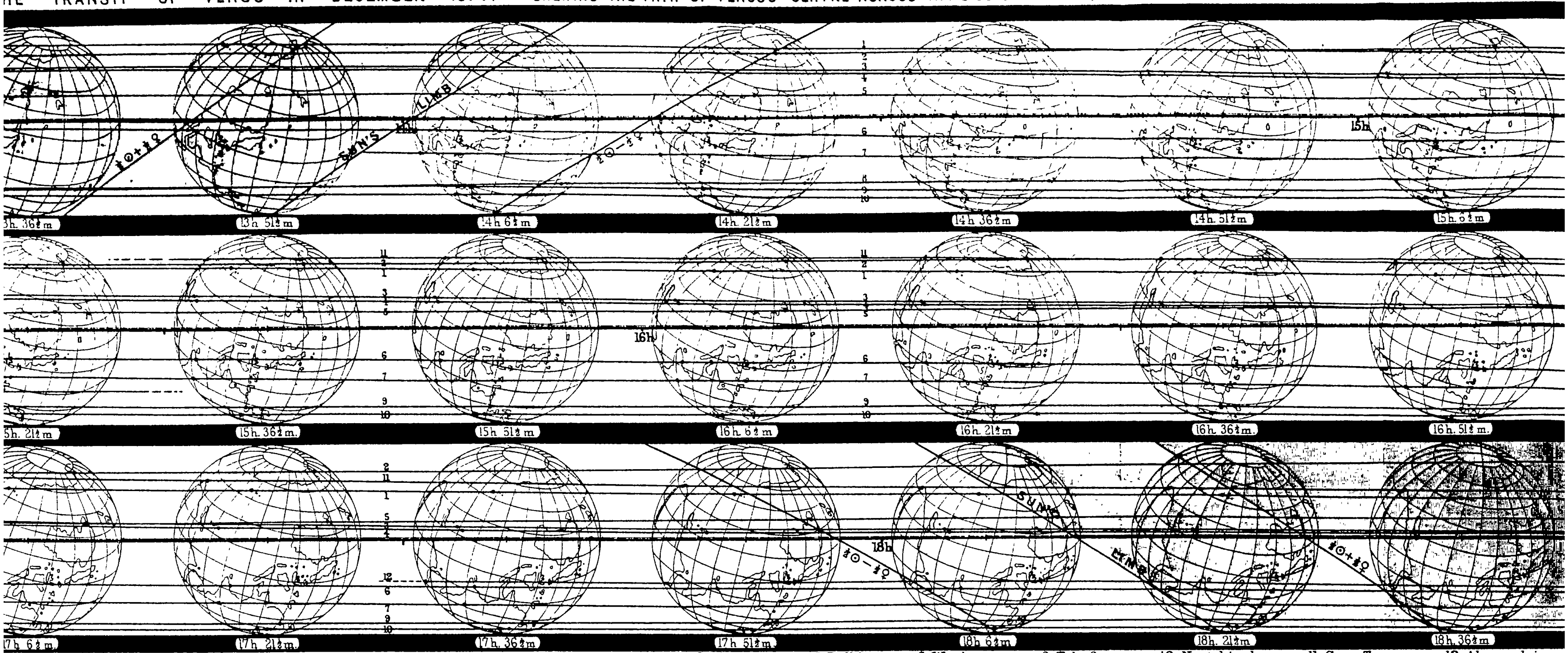
Very early during my examination of the subject of the approaching transits, I was led to adopt and state the opinion that the parallactic displacement of *Venus*, and thence the Sun's parallax, might, in the present state of instrumental astronomy, be determined at least as accurately by direct measurement of *Venus's* position at successive epochs of her transit as by either Delisle's or Halley's method. It appears impossible to eliminate the error resulting from the clinging of *Venus* to the Sun's limb, after ingress and before egress; and although several contrivances have been suggested for reducing this error, it is doubtful whether any of them will prove successful. It remains to be shown, moreover, whether photography can be successfully applied to determine the parallactic displacement of *Venus*.

I find that the German astronomers have for some time recognised the advantages which would probably result from such processes of measurement as I have mentioned; and their selection of Tchefoo, where the whole transit will be observable, indicates in a marked manner their preference for the direct method, since Tchefoo is not an exceptionally advantageous station for observing the accelerated ingress, and still less for observing the retarded egress. It is also inferior to other northern stations for applying Halley's method; and indeed German astronomers have definitely indicated their preference for the direct method.

The American astronomers have also adopted a favourable opinion as to the direct method.

It appears to me that if English astronomers are to base their methods of procedure on foreign opinions (a growing fashion which I myself am far from urging as desirable) attention might not disadvantageously be directed to the considerations resulting from the above-mentioned opinions of German and American

HE TRANSIT OF VENUS IN DECEMBER 1874. SHEWING THE PATH OF VENUS'S CENTRE ACROSS THE DISC OF THE SUN, AS SEEN FROM THE FOLLOWING TWELVE STATIONS:



len Land. 2. Possession Id 3. Mauritius. 4. Rodriguez. 5. Melbourne. 6. Madras. 7. Delhi. 8. Woahoo. 9. Tchefoo. 10. Nertchinsk. 11. Cape Town. 12. Alexandria.

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1873MNRAS..33..291P

astronomers. It is easy to perceive what these considerations are.

In the first place, it is manifest that, *cæteris paribus*, these stations will be most advantageous which show the whole transit under the most favourable conditions; and in comparing these stations, we should regard that station as the better which shows the greater proportion of the transit favourably. So that, so far as this method of observation is concerned, our selected stations at Woahoo and Alexandria would be altogether inferior to such a station as Tchefoo, since at Woahoo the Sun sets before half the transit has taken place, and at Alexandria more than half the transit is already over when the Sun rises.

It is probable, however, that few would be disposed to sacrifice such a station as Woahoo, where Delisle's method is applicable under conditions exceptionally advantageous. But it may be worth while to inquire whether so much can be said in favour of Alexandria: in fact, it appears tome that but one answer can be made to this question, so far as it relates to the action called for on England's part.

To begin with, it seems not wholly unreasonable to expect that either Italy or Greece should occupy the only really advantageous Mediterranean station. Moreover, France is to occupy Suez, and the circumstances of the transit at Suez and Alexandria will be very nearly identical, as can be seen at once from the chart which illustrates the present number of the *Notices.*

But it is when we compare the circumstances of the transit at Alexandria with those which will be presented at North Indian stations, such as Peshawur, Delhi, and so on, that we find most occasion to regret the unfortunate accident by which these North Indian stations came to be so long and so completely overlooked.

As respects the application of Delisle's method, the advantage of Peshawur is sufficiently marked. The retardation is indeed but a third of a minute greater at Peshawur than at Alexandria. But the Sun is unfortunately very low at Alexandria — only 14° above the horizon — when egress occurs, whereas at Peshawur the Sun will be more than 31° above the horizon.

The main point, however,—and I conceive it to be an extremely important point,—is that at Peshawur, at Delhi, and at many stations over the region between these places, the whole transit will be visible, and therefore processes of direct measurement can be most effectively applied. When we add to these considerations the circumstance that it is much more manifestly the duty of Great Britain to occupy this advantageous region in her own territory than to occupy Alexandria, but one opinion can be formed.

When I dwelt on these considerations, some nine months since, in a letter addressed to the Astronomer Royal, he pointed out that it was easier (and more advantageous to geography) to determine the latitude of Alexandria than that of Peshawur, and moreover that the position of Peshawur, near the Khyber Pass,

1873MNRAS..33..293D

was altogether unfavourable. Knowing something, however, of the zeal with which the survey of India is being prosecuted, and of the importance of several exact determinations of the longitudes of Indian stations, I am not altogether convinced that the determination of the longitude of Peshawur would present insurmountable difficulties or be utterly useless in a geographical sense. I observe also that the Indian railway system is to be extended to Peshawur, and therefore I venture to surmise that the place is not altogether inaccessible.

I note, in conclusion, that stations useful for Halley's method are (in the present instance) always useful, and sometimes among the very best stations for Delisle's method, while they are manifestly the most advantageous stations for the direct method. The inference is too obvious to need enforcing.

Note on the Nautical Almanac Values of the Semidiameters of the Sun and Venus used in the calculations of the Transit of Venus. By Edwin Dunkin, Esq.

In a Report prepared by Mr. G. W. Hill, entitled, "Charts and Tables for facilitating predictions of the several phases of the Transit of *Venus* in December, 1874," forming Part II. of "Papers relating to the Transit of *Venus* in 1874," published by authority of the United States Government, the following remarks on the value of the semidiameter of the Sun, used in the computations of the *Nautical Almanac*, occur on page 8, "In the British *Nautical Almanac* the value 961″·82 is used, and is the same as that given for the reduction of meridian-observations of the Sun. Le Verrier states (*Annales*, vol. vi. p. 40) that the value deduced from the previous transits of *Venus* is 958″·424. Hence it is probable that predictions from the elements of the British *Nautical Almanac* will be found to be considerably in error from this cause."

With reference to these remarks, and to prevent any misunderstanding on this important point, it is but proper to state that the value 961″·82, printed in the Preface to the *Nautical Almanac*, has not been used in the computations relating to the transit of *Venus*. This has been evident to every one who has had occasion to examine the elements inserted on page 434 of the *Nautical Almanac* for 1874. A very slight comparison of the tabular semidiameters of the Sun and *Venus*, contained in these elements, with the corresponding semidiameters in the solar and planetary sections, will show at once that *corrected* values have been adopted in the calculation of the phases of the transit as given in the *Nautical Almanac*. The amount of the correction is also clearly evident, by noting that the true semidiameter inserted on